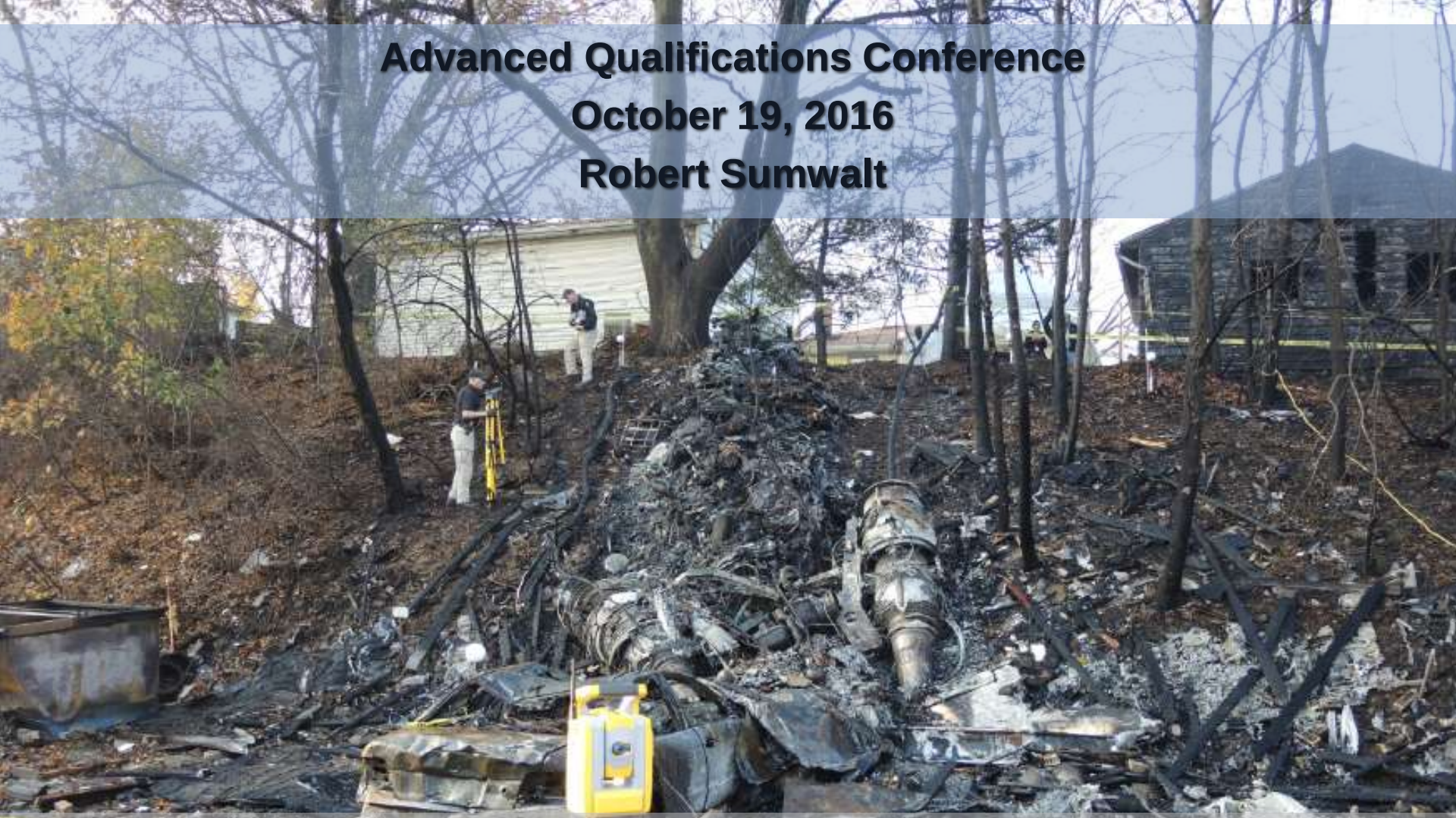
Advanced Qualifications Conference

October 19, 2016

Robert Sumwalt



Lessons from the ashes:
Ten years of learning with the NTSB

Things that keep Robert up at night

- Problems with flight path monitoring
- Flight path management
- Lack of flight deck discipline / professionalism
- Complacency

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Research conducted in 2014

- 110 NASA ASRS reports
- 25 accident reports

Facts:

- Humans are not good at monitoring highly reliable, highly automated systems for extended periods of time.

  - 42 accidents in 35 years
  - These accidents claimed **894** lives and resulted in **180** serious injuries

In 104 ASRS reports, who or what first detected the flight path deviation?

Deviation first detected by:	Number of ASRS Reports
ATC	49
Cockpit alerting system	22
Jumpseat rider	1
Crewmember	32

72

- Someone or something other than the operating crew first detected the flight path deviation in 72 of 104 reports.
  - $\chi 2 = 15.39$, $df = 1$, $p < 0.001$.

Barriers to Effective Monitoring

- Boredom
- Complacency
- Fatigue
- Time Pressure
- Mental workload
- Lack of vigilance
- Automation dependence/reliance
- Looking without seeing
  - Inattention blindness
  - Change blindness
- Poor workload management/ task allocation

"If automation is highly but not perfectly reliable in executing decision choices, then the operator may not monitor the automation and its information sources and hence fail to detect the occasional times when the automation fails"

- Raja Parasuraman, 2002

Asiana 214 – San Francisco

July 2013


U.S. NEWS
Pilots Cited in July Jet Crash
Pilots said to err in properly monitoring speed and trajectory.

"Human factors research has demonstrated that system operators often become complacent about monitoring highly reliable automated systems when they develop a high degree of trust in those systems and when manual tasks compete with automated tasks for operator attention."

- NTSB report of Asiana crash

"The PF, PM, and observer believed the A/T system was controlling speed with thrust, they had a high degree of trust in the automated system, and they did not closely monitor these parameters during a period of elevated workload.

Thus, the flight crew's inadequate monitoring of airspeed and thrust indications appears to fit this pattern involving automation reliance."

- NTSB report of Asiana crash

Change Blindness

"People are surprisingly poor at detecting even gross changes in a visual stimulus if they occur in objects that are not the focus of attention."

- S. Palmer, 1999, *Vision Science*.


MACH
ALT CRZ
NAV
AP1
1FD2
A/THR
280
260
240
220
375
370
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MACH
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Inattentional Blindness

FAA rulemaking

- By March 2019, air carriers must include specific training pertaining to improving monitoring.

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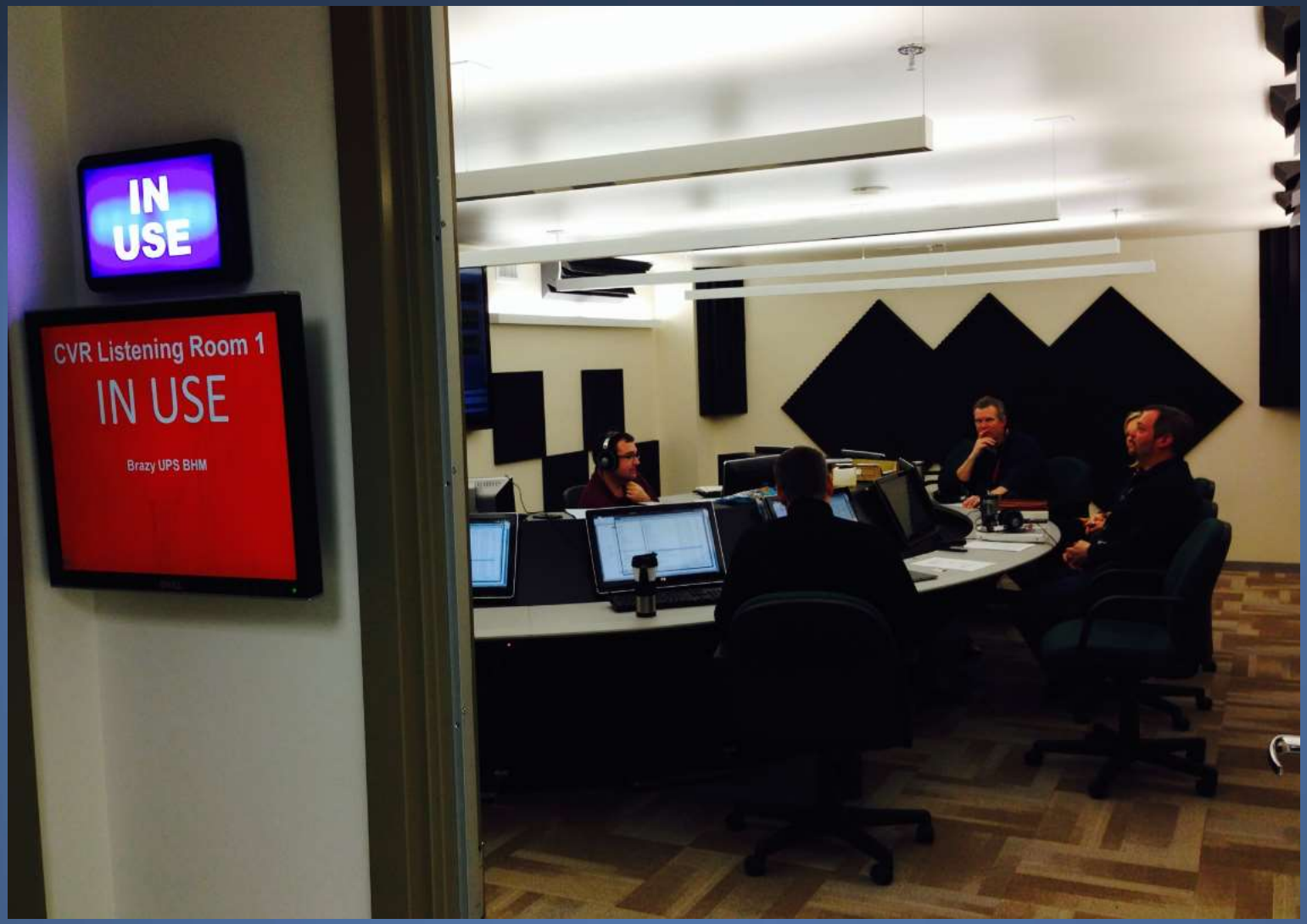

IN USE
CVR Listening Room 1
IN USE
Brazy UPS BHM

“I’m ambivalent right now. I got six months to go.”

- Captain of AA 1400

"The casual atmosphere in the cockpit before takeoff affected and set a precedent for the pilots' responses to the situations…, eroded the margins of safety provided by the standard operating procedures and checklists, and increased the risk to passengers and crew."

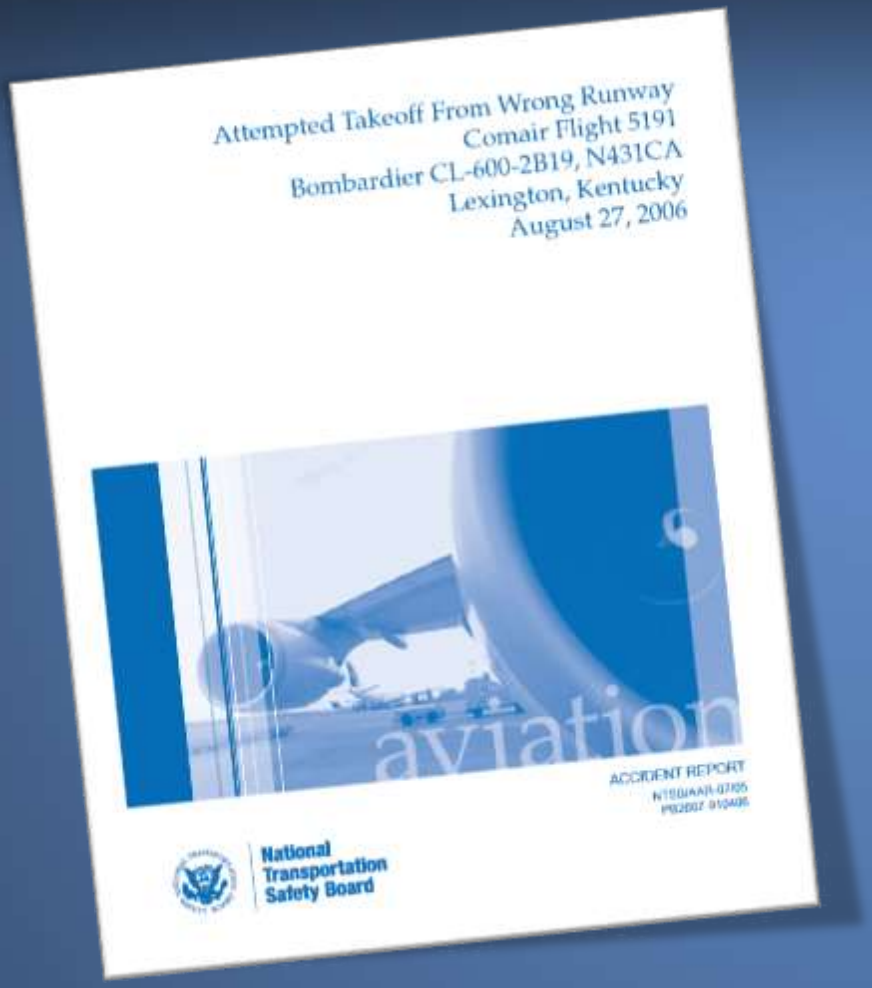
Lexington, KY

August 2006

NTSB

Time	Who	Statement / *editorial comment*
05:52.11	Capt.	“I’m easy buddy.”
05:56:14	Capt.	“run the checklist at your leisure.”
05:57:36	Capt.	“Before starting, at your leisure.”
05:58:12	Capt.	“Start engines, your leisure.”
05:59:42	Capt.	“he said it’s okay to turn one at your leisure.”
05:59:45 to 06:01:47		*Crew engages in two minutes of non-pertinent conversation during engine start*
06:03:12	Capt.	“finish it up, your leisure.”
06:03:16		*First officer initiates and captain participates in, 40 seconds of nonpertinent conversation.*
06:05:15	F/O	“churlieser [‘*at your leisure’ spoken very fast*], Comair one twenty one ready to go.”

NTSB Finding



"The flight crew's noncompliance with standard operating procedures… and both pilots' nonpertinent conversation, most likely created an atmosphere in the cockpit that enabled the crew's errors."

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“Good can be Bad”

- With good safety performance, people/organizations can easily become complacent.
- Don’t ever believe that a lack of accidents means you are “safe.”
- To counter this complacency, there must be a leadership obsession with continuous improvement.

- Courtesy of Jim Schultz

National Transportation Safety Board